

BRIEF FOR APPELLANT

Sir:

This is a Brief on appellant's Appeal from the Examiner's Final Rejection mailed November 4, 2009 concerning the above-identified application.

The Commissioner is hereby authorized to charge any additional fees, which may be required to our deposit account No. 12-1155, including all required fees under: 37 C.F.R. §1.16; 37 C.F.R. §1.17; 37 C.F.R. §1.18.; 37 C.F.R. §1.136.

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I. REAL PARTY IN INTEREST

Conopco, Inc., d/b/a Unilever, a corporation of New York is the real party in interest.

II. RELATED APPEALS AND INTERFERENCES

There are no other prior or pending appeals or interferences or judicial proceedings known to appellant, the appellant's legal representative, or assignee which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in the pending Appeal.

III. STATUS OF CLAIMS

Claims 1 – 18 stand rejected in a Final Office Action mailed September, 29, 2009.

No claims have been withdrawn

No claims have been allowed.

No claims have been cancelled.

Claims 1 -18 are on Appeal.

IV. STATUS OF AMENDMENTS

No claims were amended subsequent to the Final Office Action mailed November 4, 2009.

V. SUMMARY OF CLAIMED SUBJECT MATTER

Independent claim 1 is directed to an essentially water free composition which may be hydrated to form an end-user cosmetic composition (page 3, lines 10-12). The composition includes the following components and limitations:

- (i) less than 10 wt% water (page 3, lines 14-16),
- (ii) fatty acid (page 4, lines 24),
- (iii) from 15 to 70 wt% of a structuring agent (page 4, lines 16-17) selected from the group consisting of glycerine monostearate, glycol monostearate and a combination thereof (page 4, lines 6-7), and
- (iv) from 2 to 15 wt % fatty acid neutralized (page 5, lines 24-25) by an inorganic base (page 2, lines 15-17),
- (v) an optional emulsifying agent/surfactant, said emulsifying agent/surfactant consisting of cetyl alcohol (page 6, line 28),

wherein the fatty acid has a chainlength of from 14 to 22 carbon atoms (page 5, line 2), and

wherein the cosmetic composition is suitable for forming a skin cream or lotion on hydration when the composition is mixed with water at a temperature of from 0 to 35°C (page 9, lines 29-31) at a weight ratio of from 1:3 to 1:20 (original claim 12).

Claim 2 specifies that the amount of neutralised fatty acid recited in claim 1 is from 2.5 to 8 wt% (page 5, lines 24-25).

Claim 3 specifies that the structuring agent recited in claim 1 is glycerine monostearate (page 4, lines 8-9).

Claim 4 specifies that the amount of fatty acid recited in claim 1 is from 5 to 90 wt% based on the total amount of fatty acid and structuring agent (page 5, lines 11-12).

Claim 5 specifies that the hydrocarbon chainlength of the fatty acid recited in claim 1 is 16 to 18 carbon atoms (page 5, lines 1-3).

Claim 6 specifies that the amount of structuring agent recited in claim 1 is from 15 to 75 wt% on total weight of the composition (original claim 6).

Claim 7 specifies that the total amount of fatty acid recited in claim 1 is from 5 to 80 wt% on the total weight of the composition (original claim 7).

Claim 8 specifies that the composition recited in claim 1 includes an ingredient selected from the group consisting of, other structuring agent than glycerine monostearate and glycol monostearate, emollient oils and waxes, humectants, functional ingredients, preservatives, antioxidants, chelating agents, perfume, colouring agent and a combination thereof (page 6, lines 15-18).

Independent claim 9 is directed to a method of preparation of the composition recited claim 1. In this method an inorganic base, a fatty acid and a structuring agent which is selected from the group consisting of glycerine monostearate and glycol monostearate and a combination thereof, are mixed, heated to a temperature from 80 to 120°C, cooled to a temperature below 40°C and formed into a powder, tablet or amorphous mass (page 2, lines 15-21).

Independent claim 10 is directed to a process of hydrating the composition according to claim 1 to form a skin cream or lotion. Here, the composition is mixed with an aqueous base at a temperature of below 80°C (page 2, line 23 to page 3, line 2).

Claim 11 specifies that the temperature of the aqueous base used in the process recited in claim 10 is from 0 to 35°C (page 3, line 1).

Claim 12 specifies that the composition and the aqueous based recited in the process of claim 10 are mixed together in a weight ratio of from 1:3 to 1:20 (page 3, lines 1-2).

Claim 13 specifies that the fatty acid recited in claim 1 is selected from the group consisting of myristic acid, palmitic acid, stearic acid and mixtures thereof (page 5, lines 5-7).

Claim 14 specifies that the structuring agent recited in claim 1 is a mixture of glycerin monostearate and glycol monostearate (page 4, lines 6-7).

Claim 15 specifies that the inorganic base recited in claim 1 is potassium hydroxide (page 8, lines 12-13).

Claim 16 further narrows the ingredients recited in claim 1. The claim specifies that the fatty acid is selected from the group consisting of myristic acid, palmitic acid, stearic acid and mixtures thereof (page 5, lines 5-7); that the amount of neutralised fatty acid is from 2.5 to 8 wt% (page 5, line 25); that the structuring agent is a mixture of glycerin monostearate and glycol monostearate (page 4, lines 6-7); and the inorganic base is potassium hydroxide (page 8, lines 12-13).

Claim 17 further narrow the ingredients present in the composition which is prepared by the methods recited in claim 10. The claim specifies that the fatty acid is selected from the group consisting of myristic acid, palmitic acid, stearic acid and mixtures thereof (page 5, lines 5-7); that the amount of neutralised fatty acid is from 2.5 to 8 wt% (page 5, line 25); that

the structuring agent is a mixture of glycerin monostearate and glycol monostearate (page 4, lines 6-7); and the inorganic base is potassium hydroxide (page 8, lines 12-13).

Claim 18 specifies that the composition recited in claim 1 is in the form of a powder (examples 1-3).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Are claims 1 - 9 and 18 unpatentable under 35 USC §103(a) over Farrell et al (US 6,630,432)?

Are claims 1-8, 10, and 11- 13 unpatentable under 35 USC §103(a) over Crookham et al (US 6,576, 228)?

Is claim 14 unpatentable under 35 USC §103(a) over Farrell et al (US 6,630,432) as applied to claim 1-9 in view of Honda (JP 07025741 A)?

Are claims 15-17 unpatentable under 35 USC §103(a) over Farrell et al (US 6,630,432) and Honda (JP 07025741 A) as applied to claim 1-9, 14 in view of Saito et al (US 2002/0132743).

VII. APPELLANT'S ARGUMENTS

Are claims 1 - 9 and 18 unpatentable under 35 USC §103(a) over Farrell et al (US 6,630,432 – hereinafter “Farrell”)?

Regarding claim 1, 3, 4 and 7-9

Appellants respectfully reiterate that Farrell does not present a case of *prima facie* obviousness under § 103(a) at least because the reference neither teaches nor suggests a composition which is *suitable for forming a skin cream or lotion* when mixed with water

containing from 2 to 15 wt % fatty acid neutralized by an inorganic base alone or in combination with an optional surfactant consisting of cetyl alcohol.

Farrell et al teaches soap bars containing 40-95% of C12 to C24 fatty acid soap, i.e., neutralized fatty acid (column 3, line 53 - 40-90% in claim 1), 7-25% water (column 2, line 37) ; 0-15% of monoglyceride (e.g., glycerol mono laurate or glycerol monostearate) (column 4, line 26 and lines 34-35), 0-15% free fatty acid (column 4, line 28-30); and 2-15% of salts of α - hydroxyl acids (column 4, lines 8-10).

All the soap bar compositions disclosed by Farrell in Examples 1-11 contain 67% to 77% neutralized fatty acid derived from a combination of tallow and nut oil (table spanning columns 5-6).

When a soap bar such as those disclosed by Farrell is diluted with water it forms a cleansing solution which must be rinsed from the skin in contrast to appellants' skin cream or skin lotion compositions that are applied to and left on the skin, i.e., not rinsed from the skin.

In the Office Actions mailed March 18, 2009, and November 11, 2009, the Examiner conceded that Farrell et al does not teach the claimed concentration range of neutralized fatty acid or ratio of water. The Examiner asserted that the determination of optimal or workable concentration of neutralized fatty acid by routine experimentation is obvious absent showing of criticality of the claimed concentration. The Examiner further asserted that "one having ordinary skill in the art would have been motivated to do this to obtain the desired cleansing and lathering properties of the composition". Appellants respectfully disagree.

Farrell discloses at several places that by following the teaching of the patent, high quality soap based bars can be extruded. It is a matter of common knowledge that soap bars are designed to generate lather. In fact, according to S. Gupta in "Soap Technology for

the 1990's" Page 69, Editor: Luis Spitz, American Oil Chemists Society (1990 - Exhibit 1 in SECTION IX- Evidence).

"Lathering is one of the most important attributes of a bar of soap perceived by consumers. The lathering, in conjunction with the fragrance, are probably the two most important attributes of a bar of soap in *signally its quality* and performance to the consumer". [Emphasis added]

Appellants' have previously presented evidence in a DECLARATION (a copy of which is provided in SECTION IX – Evidence – Exhibit 2), which shows that compositions having a level of neutralized soap within the range of 2 to 15 wt % as recited in appellants' claims generates virtually no lather.

Appellants respectfully draw the Boards attention to Table 2 of the DECLARATION which gives a comparison of mixtures labeled 1A, 2A, and 3-5 in lather and foam. These compositions contained a neutralized fatty acid based on tallow/nut oil fatty acids, which is the type of fatty acid soap specifically used by Farrell in Examples 1-11. It can be seen from Table 2 that a neutralized fatty acid concentration of less than 20% produces at most a trace amount of lather and very low foaming potential (compare Mixtures 1A, 2A and 3 with Mixtures 4-5).

Furthermore, a noticeable decrease in foaming potential was found in compositions containing even 20% soap relative to 50 wt% - 80 wt% soap (compare Mixture 3 with Mixtures 4-5). This finding is entirely consistent with the limitation taught and claimed by Farrell that the soap content should be 40% to 90%.

Farrell specifically teaches the use of a fatty acid soap having a chainlength of 8 to 22 preferably 12 to 24 carbon atoms (column 3, lines 55-59) and a neutralized fatty acid soap concentration of 40 to 80 wt%.

In contrast, appellants specifically restrict the neutralized fatty to a chainlength of 14-22 carbon atoms and a neutralized fatty acid concentration of 2-15 wt% and an optional surfactant that is limited to cetyl alcohol. As clearly demonstrated by the results in the DECLARATION, an artisan who would have made soap bars utilizing these parameters would have produced bars which would have been perceived by the consumer to have virtually no lather in use. That is to say, the bars would not have been perceived by consumers to be of high quality which is directly opposite to the goals set forth by Farrell et al (column 2, lines 21-27).

Moreover, it was additionally demonstrated in the DECLARATION that dilutions of Mixtures 1 and 2 in which the neutralized fatty acid level was 15% or less and which fell into the claimed carbon chainlength exhibited the look and feel of a skin lotion or skin cream when rubbed on the skin. In contrast, dilutions with a neutralized fatty acid of chainlengths and levels outside the scope of the current invention (Mixtures 3-5) were distinctly different and formed increasingly sticky, viscoelastic stringy foams when rubbed on the skin. These results demonstrate the criticality of the limitation on neutralized fatty acid concentration and chain length to the claimed invention.

Based on the above arguments, appellants submit that a person having ordinary skill in the art would not have been motivated to modify Farrell towards appellants claimed concentration and chainlength ranges in a desire to improve cleansing and lathering properties of the composition because these changes would have in fact severely degraded cleansing and lathering properties and thus the perceived quality of the bar. Furthermore appellants' declaration provides a conclusive showing of the criticality of the claimed

concentration and chainlength range for its intended purpose, i.e., as a dilutable base for the instant preparation of a skin cream or lotion by simple dilution with water.

The Examiner has dismissed the evidence provided in the DECLARATION, stating that “unless comparisons are made with the disclosure identical (not similar) with that of the reference, affidavits or declarations comparing appellant’s results with those of the prior art have no probative value”.

Appellants respectfully submit that the Examiner has missed one of the essential points of the declaration which is that compositions falling within the scope of the current invention do not lather or foam and thus would not have had optimal lather and cleansing properties as asserted by the Examiner.

Furthermore, the comparative Examples are representative of the type and level of surfactants used in Farrell (as well as Crookham – below). Because the compositions disclosed in the prior art are bars that are made using highly specialized equipment, it is not possible for appellants to exactly duplicate the prior art. The DECLARATION provides sound scientific evidence that shifting the type and level of neutralized fatty acid from those recited in applicants’ claims would have produced a composition that would have been totally unsuitable for the application taught by Farrell because it would not have produced sufficient lather.

In summary appellants submit that a person of ordinary skill in the art would not have been lead by Farrell to the current invention at least because Farrell teaches compositions which would not yield skin creams or lotions which are designed to be left on the skin. Finally, the modifications required to achieve the compositions of the current invention would have resulted in a soap bar which would not lather and thus would not have led to “desired cleansing and lathering properties” as asserted by the Examiner.

Regarding claims 2, 5, 6, and 18

Appellants submit that claims 2, 5, 6 and 18 are even further removed from Farrell because these claims recite additional limitation not taught by Farrell.

Claim 2 specifies an even lower amount of neutralized fatty acid of from 2.5 to 8 wt% which has been demonstrated in the DECLARATION to not be capable of generating lather. Farrell specifies a neutralized fatty acid level (i.e., a soap level) of 40 to 90% and the.

Claim 5 specifies that the hydrocarbon chainlength of the fatty acid recited in claim 1 is 16 to 18 carbon atoms. Farrell teaches a soap bar composition containing 40-95% of C12 to C24 fatty acid soap. All of the Examples taught by Farrell utilize a combination of Tallow and Nut oil (e.g., coconut oil). The predominant fatty acids in nut oil are lauric (C12) and myristic (C14) fatty acid which are known to make a major contribution to the lather of a soap bar.

The Influence of the chainlength of the neutralized fatty acid is shown by a comparison of mixtures labeled 1 and 2 with 1A and 2A and 4-5 in Table 2 of the DECLARATION. Mixtures 1 and 2 are composed of a neutralized fatty acid based only on C16 and C18 fatty acids and thus does not contain any C12 or C14 fatty acid. In contrast mixtures 1A, 2A and 3-5 includes coconut oil soap and thus contains C12 and C14 fatty acid soaps. Mixtures 1 and 2 produce *absolutely no foam or lather when diluted with water*. In contrast mixtures 1A and 2A produce some foam and a trace of lather albeit far lower than would have been generated in the concentration range taught by Farrell. (Compare the foam and lather results of Mixtures 1 and 2 with Mixtures 1A, 2A and 3-5).

Claim 6 specifies that the amount of structuring agent recited in claim 1 is from 15 to 75 wt% on total weight of the composition while Farrell teaches a soap bar including 0-15% of monoglyceride.

Claim 18 specifies that the composition recited in claim 1 is in the form of a powder while Farrell teaches a composition which is fabricated into a bar or tablet which is a monolithic solid and not a powder.

Are claims 1-8, 10, and 11- 13 unpatentable under 35 USC §103(a) over Crookham et al (US 6,576, 228 – hereinafter “Crookham”)?

Appellants respectfully reiterate that Crookham does not present a case of *prima facie* obviousness under § 103(a) at least because the reference neither teaches nor suggests a composition which is *suitable for forming a skin cream or lotion* when mixed with water containing *from 2 to 15 wt % fatty acid neutralized by an inorganic base alone or in combination with an optional surfactant consisting of cetyl alcohol*.

Crookham is directed to “Personal wash sunscreen compositions which deposit and lather well” (Title – emphasis added).

Crookham discloses a bar composition comprising: (1) 20 to 85% by weight of a first anionic surfactant which is fatty acid soap or synthetic anionics; (2) 0 to 25% of a second surfactant selected from the group consisting of a second anionic (differing from the first), nonionic surfactants, amphoteric/zwitterionic surfactant, cationic surfactant, and mixtures thereof; (3) 0 to 15% fatty acid; (4) 0 to 20% of a water-soluble structurant; (5) 0 to 40% glycerol monoalkanoate; and (6) 0.1 to 10% of a sunscreen agent. (Column 4, lines 25-42)

Crookham teaches that previous attempts to deliver sunscreens from cleansers resulted in a cleanser “which had unsatisfactory user properties (e.g., low lather)”. (column 1, lines 17-22 emphasis added). Crookham further teaches that the invention provided “personal wash compositions which deposit high levels of sunscreen while maintaining good lather.” (Abstract emphasis added)

Crookham et al discloses that the composition can optionally contain cetyl alcohol which is classified as an "oil/emollient".

In various Office Actions, the Examiner has conceded that Crookham et al does not teach the claimed concentration of neutralized fatty acid or ratio of composition to aqueous base. However, the Examiner asserted that determination of optimal or workable concentration of neutralized fatty acid by routine experimentation is obvious absent showing of criticality of the claimed concentration. Emphasis added

The Examiner further asserted that "one having ordinary skill in the art would have been motivated to do this to obtain the desired *cleansing and lathering properties of the composition*".

Based on comparative results presented in a previously discussed DECLARATION from Dr. Shipping Zhu, Appellants again respectfully submit that a person of ordinary skill in the art would not have been motivated to create a composition by modifying Crookham to limit the *neutralized fatty acid* to a level 2 to 15 wt % wherein the fatty acid has a chainlength of 14 to 22 carbon atoms and wherein the composition contained only cetyl alcohol as an optional surfactant/emulsifying agent because such a composition would have generated virtually no lather. Such non-lathering compositions would be against all the teaching set forth in Crookham and defeat the whole purpose of the invention, i.e., "a personal wash compositions which deposit high levels of sunscreen while maintaining good lather" (Abstract).

The influence of wt% neutralized fatty acid on lather/foam can be seen from a comparison of Mixtures labeled 1A, 2A, and 3-5 in Table 2 of the DECLARATION. These compositions contained 7%, 13.5%, 20% 50% and 85% respectively of a tallow/nut oil soap as the neutralized fatty acid which is a *preferred soap* taught by Crookham (column 5, lines 51 and 52). It can be seen from Table 2 that a neutralized fatty acid concentration of less

than 20% (Mixtures 1A and 2A) produced at most a trace amount of lather and had very low foaming potential in a cylinder shake test (the same test utilized by Crookham - column 13, lines 1-3), i.e., table 2 - compare Mixtures 1A, 2A and 3 with Mixtures 4-5.

Furthermore, there was a noticeable decrease in foaming potential in compositions containing 20% soap (mixture 3) relative to 50 wt% soap (mixture 4) as would be expected from a reading of Crookham (table 2 - compare Mixtures 3 with Mixtures 4-5).

The Influence of chainlength of the neutralized fatty acid can be observed by a comparison of Mixtures labeled 1 and 2 with 1A and 2A and 4-5 in Table 2 of the DECLARATION. Mixtures 1 and 2 contain neutralized fatty acid which does not include any C12 fatty acid soap while mixtures 1A, 2A and 3-5 include of a C12 fatty acid soap (potassium laurate). Mixtures 1 and 2 produce absolutely no foam or lather when diluted with water. In contrast mixtures 1A and 2A produce some foam and a trace of lather albeit far lower than at the concentration taught by Crookham. (Compare the foam and lather results of Mixtures 1 and 2 with Mixtures 1A, 2A and 3-5).

In contrast to Crookham et al, appellants specifically restrict the neutralized fatty to a chainlength of 14-22 carbon atoms and to a concentration of 2-15 wt% and limit any optional surfactant/emulsifier to *cetyl alcohol*. As clearly demonstrated by the results in the DECLARATION discussed above, an artisan who would have made soap bars or liquid cleansers utilizing applicants' composition parameters, which are far outside those recited by Crookham, would have indeed produced compositions having virtually no lather during use which is directly opposite to the goals of Crookham.

Moreover, appellants submit that the "formulation rules" taught by Crookham (column 4, lines 25-42) would have specifically taught the artisan that the bar composition would have had to include an additional surfactant which must be a synthetic anionic surfactant, whenever the fatty acid soap concentration in the composition is between 2-15 wt%. In contrast applicants claims construction expressly limits optional surfactant to cetyl alcohol.

It was additionally demonstrated in the DECLARATION that dilutions of Mixtures 1 and 2 in which the neutralized fatty acid level was 15% or less and which fell into the claimed carbon chainlength exhibited the look and feel of a skin lotion or skin cream when rubbed on the skin. In contrast, dilutions with a neutralized fatty acid chainlengths and levels outside the scope of the current invention (Mixtures 3-5) were distinctly different and formed increasingly sticky, viscoelastic stringy foams when rubbed on the skin. These results demonstrate the criticality of the limitation on neutralized fatty acid concentration and chain length to the claimed invention.

Based on the above arguments, appellants submit that a person having ordinary skill in the art would not have been motivated to modify Crookham in the way suggested by the Examiner (concentration and chainlength of neutralized fatty acid, and only cetyl alcohol as optional surfactant) in a desire to improve cleansing and lathering properties of the composition because these changes would have in fact severely degraded cleansing and lathering properties and would have been inconstant with the expressed teachings of Crookham. Furthermore appellants' declaration provides a conclusive showing of the criticality of the claimed concentration and chainlength range for its intended purpose, i.e., as a base for the preparation of skin cream or lotion by simple dilution with water.

Regarding claims 2, 5 and 18

Appellants submit that claims 2, 5 and 18 are even further removed from Crookham because these claims recite additional limitation not taught by Crookham.

Claim 2 specifies an even lower amount of neutralized fatty acid of from 2.5 to 8 wt% which are incapable of generating lather (e.g., example 1A Table 2 of the DECLARATION) whereas Crookham specifically teaches lathering cleaning compositions containing 20 to 85% by weight of a first anionic surfactant which is fatty acid soap or synthetic anionics and

Crookham teaches in the examples, compositions having 30+ wt% soap and/or synthetic surfactant.

Claim 5 specifies that the hydrocarbon chainlength of the fatty acid recited in claim 1 is 16 to 18 carbon atoms. Crookham teaches that preferred soaps have 12-18 carbon atoms (column 5, lines 39-40).

The Influence of the chainlength of the neutralized fatty acid is shown by a comparison of mixtures labeled 1 and 2 with 1A and 2A and 4-5 in Table 2 of the DECLARATION. Mixtures 1 and 2 are composed of a neutralized fatty acid based only on C16 and C18 fatty acids and thus does not contain any C12 or C14 fatty acid. In contrast mixtures 1A, 2A and 3-5 includes coconut oil soap and thus contains C12 and C14 fatty acid soaps. Mixtures 1 and 2 produce *absolutely no foam or lather when diluted with water*.

Claim 18 specifies that the composition recited in claim 1 is in the form of a powder while Crookham teaches a composition which is fabricated either into a bar or tablet (a monolithic solid) or a liquid.

Is claim 14 unpatentable under 35 USC §103(a) over Farrell et al (US 6,630,432) as applied to claim 1-9 in view of Honda (JP 07025741 A)?

Farrell et al and appellants' invention have already been discussed.

Honda was relied upon for teaching a skin composition comprising polyethylene glycol monostearate and glycerin monostearate. Office Action page 5.

Honda does not remedy the shortcoming of Farrell et al as a prior art 103(a) reference over claim 1 on which claim 14 depends because Honda like Farrell does not teach or suggest a composition which is *suitable for forming a skin cream or lotion* when

mixed with water containing from 2 to 15 wt % fatty acid neutralized by an inorganic base alone or in combination with an optional surfactant consisting of cetyl alcohol.

Furthermore, appellants respectfully point out as supported by Exhibits 3 and 4 set forth in the Evidence Section (IX) that polyethylene glycol monostearate is a different chemical compound from glycol monostearate. Glycol monostearate (Exhibit 3) is a synonym for ethylene glycol monostearate which is a different and distinct chemical species from polyethylene glycol monostearate (Exhibit 4).

Thus, the combination of Farrell et al and Honda does not teach the combination of glycerin monostearate and glycol monostearate (ethylene glycol monostearate) recited in claim 14 but rather the combination of glycerin monostearate and polyethylene glycol monostearate and glycerin.

Are claims 15-17 unpatentable under 35 USC §103(a) over Farrell et al (US 6,630,432) and Honda (JP 07025741 A) as applied to claim 1-9, 14 in view of Saito et al (US 2002/0132743).

Farrell and Honda were already discussed above.

Saito was relied upon by the Examiner for teaching "skin compositions comprising fatty acids, e.g., myristic, palmitic and stearic that are neutralized with an aqueous solution of potassium hydroxide". Office Action Page 6

Saito in fact teaches a transparent soap bar composition that includes 20% to 40% of a fatty acid soap [0027], preferably of 8-20 carbon atoms [0024], at least one amphoteric surfactant [0013], and a nonionic surfactant [0017] (which does not include cetyl alcohol [0040]). Saito specifically teaches that if the soap content is below 20%, the composition has a low solidifying point which would impair its commercial value [0027].

Saito is silent regarding the presence of un-neutralized or free fatty acid in the composition and none of the examples include any fatty acid which is unneutralized. All the exemplary compositions taught by Saito do not contain any fatty acid and all have what is described as "good to excellent" foaming properties.

Saito does not remedy the shortcomings of the combination of Farrell et al and Honda as a 103(a) prior art reference over claims 1 and 14 because the Saito does not teach or suggest a composition which is *suitable for forming a skin cream or lotion when mixed with water containing from 2 to 15 wt % fatty acid neutralized by an inorganic base alone or in combination with an optional surfactant consisting of cetyl alcohol or a composition that includes glycerin monostearate and glycol monostearate (i.e., ethylene glycol monostearate) .*

Thus, the combination of Farrell et al, Honda and Saito does not teach all the elements recited in claims 15 – 17.

Furthermore, since Saito like Farrell et al teaches high lathering soap bar compositions requiring much higher levels of soap, a person of ordinary skill in the art would not have been motivated to modify the disclosed compositions to arrive at appellants' skin cream or lotion base because the modified composition would be unsuitable for a soap bar, i.e., the resulting bar would have lathered like a brick!

Claims 18 is even further removed from the combination of the prior art of record because it requires that the composition recited in claim 1 is in the form of a powder while Farrell or Saito teach compositions which are fabricated into a bar or tablet (a monolithic solid) while Honda teaches a liquid composition.

In view of the forgoing arguments, appellants submit that the claims at issue are not obvious over the references cited by the Examiner. Appellants respectfully request the Board of Appeals and Interferences to reverse the rejection and have the Examiner issue the claims.

Respectfully submitted,

/ Michael P. Aronson /

Michael P. Aronson
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Agent for Appellants

MPA/sm
201-894-2412 or 845-708-0188

VIII. CLAIMS APPENDIX

Claim 1. A cosmetic composition comprising:

- (i) less than 10 wt% water
- (ii) fatty acid,
- (iii) from 15 to 70 wt% of a structuring agent selected from the group consisting of glycerine monostearate, glycol monostearate and a combination thereof, and
- (iv) from 2 to 15 wt % fatty acid neutralized by an inorganic base,
- (v) an optional emulsifying agent/surfactant, said emulsifying agent/surfactant consisting of cetyl alcohol,

wherein the fatty acid has a chainlength of from 14 to 22 carbon atoms, and

wherein the cosmetic composition is suitable for forming a skin cream or lotion on hydration when the composition is mixed with water at a temperature of from 0 to 35°C at a weight ratio of from 1:3 to 1:20.

Claim 2. Cosmetic composition according to claim 1, wherein the amount of neutralised fatty acid is from 2.5 to 8 wt%.

Claim 3. Cosmetic composition according to claim 1, wherein the structuring agent is glycerine monostearate.

Claim 4. Cosmetic composition according to claim 1, wherein the amount of fatty acid is from 5 to 90 wt% based on the total amount of fatty acid and structuring agent.

Claim 5. Cosmetic composition according to claim 1, wherein the hydrocarbon chainlength of the fatty acid is 16 to 18 carbon atoms.

Claim 6. Cosmetic composition according to claim 1, wherein the amount of structuring agent is from 15 to 75 wt% on total weight of the composition.

Claim 7. Cosmetic composition according to claim 1, wherein the total amount of fatty acid is from 5 to 80 wt% on the total weight of the composition.

Claim 8. Cosmetic composition according to claim 1, which further comprises an ingredient selected from the group consisting of, other structuring agent than glycerine monostearate and glycol monostearate, emollient oils and waxes, humectants, functional ingredients, preservatives, antioxidants, chelating agents, perfume, colouring agent and a combination thereof.

Claim 9. Method for the preparation of a composition according to claim 1, wherein an inorganic base, a fatty acid and a structuring agent selected from the group consisting of glycerine monostearate and glycol monostearate and a combination thereof are mixed, heated to a temperature from 80 to 120 °C, cooled to a temperature below 40 °C and formed into a powder, tablet or amorphous mass.

Claim 10. A process of hydrating a composition according to claim 1 to form a skin cream or lotion, wherein the composition is mixed with an aqueous base at a temperature of below 80 °C.

Claim 11. A process according to claim 10, wherein the temperature of the aqueous base is from 0 to 35 °C.

Claim 12. A process according to claim 10, wherein the composition and the aqueous based are mixed together in a weight ratio of from 1:3 to 1:20.

Claim 13. Cosmetic composition according to claim 1 wherein the fatty acid is selected from the group consisting of myristic acid, palmitic acid, stearic acid and mixtures thereof.

Claim 14. Cosmetic composition according to claim 1 wherein the structuring agent is a mixture of glycerin monostearate and glycol monostearate.

Claim 15. Cosmetic composition according to claim 1 wherein the inorganic base is potassium hydroxide.

Claim 16. Cosmetic composition according to claim 1 wherein the fatty acid is selected from the group consisting of myristic acid, palmitic acid, stearic acid and mixtures thereof; the amount of neutralised fatty acid is from 2.5 to 8 wt%; the structuring agent is a mixture of glycerin monostearate and glycol monostearate; and the inorganic base is potassium hydroxide.

Claim 17. The method according to claim 10, wherein in the composition, the fatty acid is selected from the group consisting of myristic acid, palmitic acid, stearic acid and mixtures thereof; the amount of neutralised fatty acid is from 2.5 to 8 wt%; the structuring agent is a mixture of glycerine monostearate and glycol monostearate; and the inorganic base is potassium hydroxide.

Claim 18. Cosmetic composition according to claim 1 wherein the composition is in the form of a powder.

IX. EVIDENCE APPENDIX

**EXHIBIT 1 – Excerpt from S. Gupta in “Soap Technology for the 1990’s” Page 69,
Editor: Luis Spitz, American Oil Chemists Society**

EXHIBIT 2 – DECLARATION dated December 5, 2008, from Dr. Shiping Zhu

EXHIBIT 3 – Product Identification of glycol monostearate

EXHIBIT 4 – Product Identification of polyethylene glycol monostearate

EXHIBIT 1

Excerpt from S. Gupta in "Soap Technology for the 1990's" Page 69, Editor: Luis Spitz,
American Oil Chemists Society

Soap Technology For The 1990's

Edited By
Luis Spitz



American Oil Chemists' Society
Champaign, Illinois

AOCS Mission Statement

To be a forum for the exchange of ideas, information and experience among those with a professional interest in the science and technology of fats, oils and related substances in ways that promote personal excellence and provide for a high standard of quality.

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$$30\% \text{ NaOH}_{\text{ADDED}} = \frac{2.16}{208} \times \frac{40}{30} \times 100 = 1.38 \text{ lb}$$

To summarize in molar equivalents, the formulas containing free fatty acids will have the following weight ratios:

Coconut Fatty Acid_{WT} < Stearic Acid_{WT}.

To illustrate, 5% coconut fatty acid, MW 208 (as FFA) = 6.6% stearic acid, MW 274 (as FFA). In other terms, it will take a greater quantity of stearic acid than coconut fatty acid to neutralize a given quantity of alkali.

Bar Soap Properties

The physico-chemical properties of soap, such as physical constants, X-ray structure, and solubility data, are described in depth in well known monographs (8).

In the present section, the following product formula related attributes shall be discussed:

- Bar Lathering
- Bar Soap Lather Panel Test
- Bar Cracking
- Bar Mushing & Wear Rate
- Bar Rinsability
- Bar Efflorescence
- Bathtub Deposits
- Bar Graininess & Bar Smoothness
- Soap Alkaline Reaction
- Fatty Acid Migration
- Cleansing

The evaluation of the above properties is usually conducted by a combination of laboratory tests and consumer panels. An excellent book on the statistical treatment of consumer data has recently been published (9).

Bar Lathering

The lathering is one of the most important attributes of a bar of soap perceived by the consumer. The lathering, in conjunction with the fragrance, are probably the two most important attributes of a bar of soap in signaling its quality and performance to the consumer. The lathering

EXHIBIT 2

DECLARATION dated December 5, 2008, from Dr. Shiping Zhu

Attorney Docket No.: T7105(C)
Serial No.: 10/581,292
Filed: June 1, 2006
Confirmation No.: 3161

DECLARATION UNDER 37 CFR §1.132

I, Shiping Zhu, declare and state:

1. I am an British citizen, residing at 32 Tiverton Road, Bedford, MK40 3DL, UK
2. I have been awarded the degree of *PhD* from Imperial college, London
3. I have been employed by Unilever since August 1998, and am presently a Research Scientist In Corporate Research at Unilever's Colworth Laboratory. During my employment at Unilever, I have been engaged in research on phase behaviour and structuring of complex materials related to skin care products.
4. I am one of the named inventors of U.S. patent application Serial Number 10/581,292 hereafter designated "APPLICATION".
5. I supervised the performance of the experiments described below.
6. Given my education and experience, particularly in the area of skin care and surfactant containing compositions, I consider myself able to provide the following testimony based on experiments conducted by me or under my supervision.

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COMPARATIVE TESTING

Seven mixtures were prepared whose compositions are summarized in Table 1. Mixture 1 contains about 7% neutralized fatty acid ("soap") and has essentially the same composition as Example 1 of the APPLICATION (Table 1, page 12). Mixture 2 contains 13.5% neutralized fatty acid and has the same composition as Example 3 of the APPLICATION (Table 3, page 14).

The fatty acids and the neutralized fatty acids in Mixtures 1 and 2 were from the same fatty acid blend which in this case was Pristearine® 4911 which has the following fatty acid distribution: 52% stearic (C18), 45% palmitic acid (C16)) and 2% myristic acid (C14).

Mixture 1A and 2A have the same composition as mixture 1 and 2 except that the potassium soap used is derived from the neutralization of an 80/20 mixture of fatty acids derived from beef tallow and coconut oil.

Soaps formed from the neutralization of fatty acids derived from tallow and coconut oil blends are widely used in the manufacture of soap bars and are taught as preferred soaps by for example Crookham et al in US Patent No. 6,576,228 and by Farrell et al in US Patent No.6,630,432. The composition of this blend is approximately: 10% potassium laurate, 6% potassium myristate, 23% potassium palmitate, 17% potassium stearate and 31% potassium oleate. The relatively high levels of the more soluble laurate and oleate soaps are required to produce abundant lather

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Mixtures 3-5 have increasing levels of the tallow/coco soap blend (20% to 85%) relative to Mixture 2A (13.5%). However, the remaining solid components in mixtures 3-5 (glycerol monostearate, glycol monostearate, cetyl alcohol, and fatty acid) are present in the same relative proportions as in Mixture 2A, i.e., the soap was substituted for the remaining solids and the water content was held constant.

Mixtures 3-5 have a soap content within the range disclosed for personal washing bars (e.g., soap bars) by Crookham et al (column 3 line 21-23) and by Farrell et al (column 3, lines 52-54).

II. Sample Preparation

All the mixtures were prepared according to the method disclosed in the APPLICATION under Example 1. In summary, all the ingredients of each composition were mixed and heated to above 80°C. Subsequently, the mixture was cooled to about 20°C and then ground into a powder. Mixtures 1 and 2 formed an isotropic liquid at 80°C, while mixtures 1A, 2A, and 3-5 did not dissolve or melt completely.

III. Comparative testing process

The mixtures were diluted with water to a concentration of 5% and 10% by weight and assessed on the following attributes

a. **Foam** Foam was assessed by a method similar to that disclosed by Crookham et al (column 13, lines 1-5). A 40 gm sample of each dilution was placed in a 100 ml graduated cylinder, shaken for 10 seconds and the foam volume recorded.

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b. Lather A few milliliters of each dilution was placed in the palm of one hand and diluted with 1-3 drops of water and rubbed between the hands for 30 seconds. The ability of the test mixture each to form lather (concentrated dispersion of small gas bubbles dispersed in a liquid) was visually assessed.

c. Qualitative rheological and visual properties The thickness, visual appearance and rheological properties were qualitatively assessed by observing the flow of each dilution and how it looked and felt when rubbed on the skin.

Table 1 Compositions of Experimental Mixtures

Mixture No.	1	2	1A	2A	3	4	5
COMPONENT							
Glycerol monostearate	58.5	47.5	58.5	47.5	43.7	26.6	6.6
Glycol monostearate	8.5	9.5	8.5	9.5	8.8	5.3	1.3
Cetyl alcohol	5	7	5	7	6.4	3.9	0.97
C14/C16/18 Fatty acid (Pristearine® 4911)	18.5	19	18.5	19	17.5	10.6	2.6
Potassium soap C14/C16/18 Fatty acid (Pristearine® 4911) neutralized with potassium hydroxide	7	13.5					
Potassium soap blend of 80% tallow and 20% coconut oil fatty acids neutralized with potassium hydroxide			7	13.5	20	50	85
Water	1.7	3.5	1.7	3.5	3.5	3.5	3.5

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IV. Results

A. Foam and Lather. The results of foam volume measurements and lather generation assessments are collected in Table 2.

Table 2. Experimental Foam and Lather generation

PROPERTY	Type of Neutralized Fatty Acid	% Neutralized Fatty Acid	Dilution (%)	Foam Volume by cylinder shake test (ml)	Lather generated by rubbing
MIXTURE NO.					
1	Pristearine® 4911	7%	5.0	Nil	No
			10.0	Nil	No
1A	80/20 Tallow coco soap	7%	5.0	6.5	No
			10.0	Nil	Trace - noticeable but much less than mixtures 3-5
2	Pristearine® 4911	13.5%	5.0	Nil	No
			10.0	Nil	No
2A	80/20 Tallow coco soap	13.5%	5.0	6	No
			10.0	Nil	Trace - noticeable but much less than mixtures 3-5
3	80/20 Tallow coco soap	20%	5.0	15	Yes
			10.0	2	Yes
4	80/20 Tallow coco soap	50%	5.0	33	Yes
			10.0	35	Yes
5	80/20 Tallow coco soap	85%	5.0	25	Yes
			10.0	25	Yes

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Inspection of Table 2 indicates the following:

- o No lather or foam was generated from dilutions of mixtures 1 and 2 in which the neutralized fatty acid was derived from a mixture of stearic acid, palmitic acid and myristic acid.
- o Only mixtures 3-5 which have soap levels of 20% to 85% generated significant foam and lather, especially for mixtures 4 and 5 which contain 50% and 85% soap respectively. The quality of the lather generated from dilutions of mixtures 3-5 is typical of what one observes by rubbing a soap bar on the skin in the presence of water, i.e., washing hands with a bar of soap.
- o Mixtures 1A and 2A in which the neutralized fatty acid was a blend of tallow and coco soap present at a level less than 20% (7% and 13.5% generated slight foam and trace but noticeable lather under some conditions. However, the lather generation was far less than that generated when the soap content was 20% or more.

B. Qualitative observations on rubbing dilutions of the mixtures on the skin.

Dilutions of mixtures 1A, 2A and 3-5 were all noticeable less viscous than dilutions of mixtures 1 and 2.

Dilutions of mixtures 1 and 2 and to a lesser extent mixtures 1A and 2A had a look and feel of a skin lotion or skin cream when rubbed on and into the skin. In contrast, dilutions of mixtures 3-5 were distinctly different and formed increasingly sticky, viscoelastic stringing foams when rubbed on the skin.

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V. Conclusions

The results presented above indicate that mixtures having compositions selected according to the APPLICATION, form products that have the sensory properties of a skin lotion or skin cream when diluted with water provided the %neutralized fatty acid is less than about 15% (7% or 13.5% by weight in the present experiments). In this composition range a neutralized fatty acid derived from a combination of palmitic acid, stearic acid and myristic acid provided products that were more viscous and had no tendency to produce even a trace of lather or foam compared with products in which the fatty acid was derived from a mixture of tallow and coco fatty acids (80/20). The latter fatty acid blend contains lauric and oleic acids in addition to palmitic, stearic and myristic acids.

Mixtures which contained 20% or greater tallow/coco soap with remaining ingredients selected according to the APPLICATION did not have the sensory properties of a skin lotion or cream when diluted with water. These products foamed and generated a lather when rubbed on the skin similar to the lather formed with a soap bar.

I further declare that all statements made herein of my own knowledge are true and all statements made on information and belief are believed to be true; and further these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of title 18 of the United States Code, and that such willful false statements may jeopardize the validity of this patent application or any patent issuing thereon.

Dated: 05-Dec-2008

2- Shiping Zhu
Shiping Zhu

EXHIBIT 3

Product Identification of glycol monostearate



ETHYLENE GLYCOL MONOSTEARATE

PRODUCT IDENTIFICATION

CAS NO. 111-60-4

EINECS NO. 203-886-9

FORMULA $C_{20}H_{40}O_3$

MOL WT. 328.53

H.S. CODE

DERIVATION

TOXICITY Oral rat LD50: 2000 mg/kg

SYNONYMS Glycol Monostearate;

Octadecanoic Acid, 1,2-Ethanediy Ester; Ethylene Octadecanoate; 1,2-Ethanediy Octadecanoate; Ethylene Glycol Monooctadecanoate; 2-Hydroxyethyl stearate;

CLASSIFICATION

PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE pale yellow waxy flake

MELTING POINT 58 - 63 C

BOILING POINT 149 C

SPECIFIC GRAVITY

SOLUBILITY IN WATER Insoluble

pH

VAPOR PRESSURE

REFRACTIVE INDEX

NFPA RATINGS

AUTOIGNITION

FLASH POINT 240 C

STABILITY Stable under ordinary conditions

APPLICATIONS

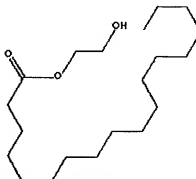
Nonionic surfactants are surface active agents which do not dissociate into ions in aqueous solutions, unlike anionic surfactants which have a negative charge and cationic surfactants which have a positive charge in aqueous solution. Nonionic surfactants are more widely used as detergents than ionic surfactants because anionic surfactants are insoluble in many hard water and cationic surfactants are considered to be poor cleaners. In addition to detergency, nonionic surfactants show excellent solvency, low foam properties and chemical stability. It is thought that nonionic surfactants are mild on the skin even at high loadings and long-term exposure. The hydrophilic group of nonionic surfactants is a polymerized alkene oxide (water soluble polyether with 10 to 100 units length typically). They are prepared by polymerization of ethylene oxide, propylene oxide, and butylene oxide in the same molecule. Depending on the ratio and order of oxide addition, together with the number of carbon atoms which vary the chemical and physical properties, nonionic surfactant is used as a wetting agent, a detergent, or an emulsifier.

EG fatty esters are used as pearling agent in low viscosity shampoos, cleansing creams, liquid soaps and bath gels. Also used as an opacifier and emulsifier in lotions, and conditioners.

SALES SPECIFICATION

APPEARANCE pale yellow waxy flake

HLB VALUF 3.5(c.a)



ACID VALUE	3.0 max (mg KOH/g)
HYDROXY VALUE	75 - 95 (mg KOH/g)
SAP VALUE	170 - 185 (mg KOH/g)
COLOR	1 max (Gardner)
TRANSPORTATION	
PACKING	25kgs in bag
HAZARD CLASS	
UN NO.	
OTHER INFORMATION	
European Hazard Symbols:	n/a, Risk Phrases: n/a, Safety Phrases: 24/25
GENERAL DESCRIPTION OF GLYCOL	

Glycol: any of a class of organic chemicals characterized by having separate two hydroxyl (-OH) groups, contribute to high water solubility, hygroscopicity and reactivity with many organic compounds, on usually linear and aliphatic carbon chain. The general formula is $C_nH_{2n}(OH)_2$ or $(CH_2)_n(OH)_2$. The wider meaning names include diols, dihydric alcohols, and dihydroxy alcohols.

Polyethylene glycols and polypropylene glycols are sometimes called polyglycols which are derived by polymerization of ethylene oxide and propylene oxide respectively. Polyethylene glycols are water-soluble at all molecular weights, but polypropylene glycols become increasingly less water-soluble at high molecular weights. Ethylene glycol, $HOCH_2CH_2OH$, is the simplest member of the glycol family. Mono-, di- and triethylene glycols are the first three members of a homologous series of dihydroxy alcohols. They are colourless, essentially odourless stable liquids with low viscosities and high boiling points. Ethylene glycol is a colourless, odourless, involatile and hygroscopic liquid with a sweet taste. It is somewhat viscous liquid; miscible with water; boiling point 198 °C; melting point 13 °C; soluble in ethanol, acetone, acetic acid, glycerine, pyridine, aldehydes; slightly soluble in ether; insoluble in oil, fat, hydrocarbones. It is prepared commercially by oxidation of ethylene at high temperature in the presence of silver oxide catalyst, followed by hydration of ethylene oxide to yield mono-, with di-, tri-, and tetraethylene glycols as co-products. The yields of ethylene glycol are depend on pH conditions. The acid-catalyzed condition in the presence of excess water provides the highest yield of monoethylene glycol. Because of its low freezing point, involatility and low corrosive activity, it is widely used in mixtures of automobile antifreeze and engine-cooling liquids. Ethylene glycol has become increasingly important in the plastics industry for the manufacture of polyester fibers and resins, including polyethylene terephthalate, which is used to make plastic bottles for soft drinks (PET bottles). MEG is the raw material in the production of polyester fiber, PET resins, alkyd, and unsaturated polyester. Diethylene glycol, $CH_2OHCH_2OCH_2CH_2OH$, is similar in properties to MEG, but with a higher boiling point, viscosity, and specific gravity. Diethylene glycol is used in the manufacture of unsaturated polyester resins, polyurethanes and plasticizers. It is a water-soluble liquid; boiling point 245 °C; soluble in many organic solvents. It is used as a humectant in the tobacco industry and in the treatment of corks, glue, paper and cellophane. Diethylene glycol (DEG) is derived as a co-product with ethylene glycol and triethylene glycol. The industry generally operates to maximize MEG production. Ethylene glycol is by far the largest volume of the glycol products in a variety of applications. Availability of DEG will depend on demand for derivatives of the primary product, ethylene glycol, rather than on DEG market requirements. Triethylene glycol, $HO(C_2H_4O)_3H$, is a colourless, odourless, non-volatile, and hygroscopic liquid. It is characterised by two hydroxyl groups along with two ether linkages, which contribute to its high water solubility, hygroscopicity, solvent properties and reactivity with many organic compounds. DEG is used in the synthesis of morpholine and 1,4-dioxane. TEG is displacing diethylene glycol in many of these applications on account of its lower toxicity. TEG finds use as a vinyl plasticizer, as an intermediate in the manufacture of polyester resins and polyols, and as a solvent in many miscellaneous applications. Triethylene glycol (TEG) is derived as a coproduct in the manufacture of ethylene glycol from ethylene oxide, and from "on-purpose" TEG production using diethylene glycol. Some capacities are based on total capacity for ethylene glycols. The main uses for TEG depend upon its hygroscopic properties. Air conditioning systems use TEG as dehumidifiers and, when volatilized, as an air disinfectant for

bacteria and virus control. Glycols, having high boiling point and affinity for water, are employed as liquid desiccant for the dehydration of natural gas. The dehydration means the removal of water vapor in refinery tower so that dry hydrocarbon gases can exit from the top of the tower. There are wide range of glycol ethers which have bifunctional nature of ether and alcohol. cellosolves are monoether derivatives of ethylene glycol. They are excellent solvents, having solvent properties of both ethers and alcohols. Glycol family products are versatile compounds used in the fields include;

- Anti-freezing and anti-icing additive
- Intermediate in polymer production and chemical reaction
- Solvent or plasticizer for plastic, lacquer, paint and varnish
- Hydraulic, brake, thermal exchange fluids and fuel additive
- Humidifying and plasticizing
- Dehydrating
- Coupling printing inks
- Textile conditioning
- Solvent for dyes in textile and leather finishing
- Agricultural formulation
- General purpose cleaners
- Explosives manufacture
- Electrolytic component
- Humectant
- Water-based coating
- Preservative, rust remover, and disinfectant

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EXHIBIT 4

Product Identification of polyethylene glycol monostearate



POLYETHYLENEGLYCOL MONOSTEARATE

PRODUCT IDENTIFICATION

CAS NO 9004-99-3

EINECS NO.

FORMULA $C_{17}H_{35}COCO(CH_2CH_2O)_n$

MOL WT.

H.S. CODE

TOXICITY

SYNONYMS

polyglycol monostearate;

Oxyethylenated stearyl alcohol; POE monostearate; POE monostearate ether;

Polyoxyethylene monostearyl ether; Poly(oxyethylene) monostearate; Polyethylene glycol monooctadecyl ether;

DERIVATION

CLASSIFICATION SURFACTANT

PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE light amber semisolid

MELTING POINT

BOILING POINT

SPECIFIC GRAVITY

SOLUBILITY IN WATER Dispersible

pH

VAPOR DENSITY

REFRACTIVE INDEX

NFPA RATINGS

Health: 1; Flammability: 1; Reactivity: 0

FLASH POINT

STABILITY

Stable under ordinary conditions

APPLICATIONS

Polyethylene glycol is a condensation polymers of ethylene oxide and water with the general formula $H(OCH_2CH_2)_nOH$, where n is the average number of repeating oxyethylene groups typically from 4 to about 180. The low molecular weight members from n=2 to n=4 are diethylene glycol, triethylene glycol and tetraethylene glycol respectively, which are produced as pure compounds. The low molecular weight compounds upto 700 are colorless, odorless viscous liquids with a freezing point from -10 C (diethylene glycol), while polymerized compounds with higher molecular weight than 1,000 are waxlike solids with melting point upto 67 C for n 180. The abbreviation (PEG) is termed in combination with a numeric suffix which indicates the average molecular weights. One common feature of PEG appears to be the water-soluble. It is soluble also in many organic solvents including aromatic hydrocarbons (not aliphatics). They are used to make emulsifying agents and detergents, and as plasticizers, humectants, and water-soluble textile lubricants. Polyethylene glycol is non-toxic, odorless, neutral, lubricating, nonvolatile and nonirritating and is used in a variety of pharmaceuticals and in medications as a solvent, dispensing agent, ointment and suppository bases, vehicle, and tablet excipient. Lipophilic compounds are ethoxylated ethylene oxide (the monomer of polyglycols) so that the target compounds have hydrophilic (soluble in water). The bifunctionality in one molecule provides the basic properties of surfactants. Fatty acids rather lipophilic (or hydrophobic) exhibiting low HLB (Hydrophilic-Lipophilic Balance) values; having an affinity for, tending to combine with, or capable of dissolving in lipids (or water-insoluble). While, the ethoxylated fatty acids are hydrophilic exhibiting high HLB values; having an affinity for water; readily absorbing or dissolving in water. The type of fatty acid and the mole number of ethylene oxide provides diverse HLB values for proper applications. There are almost infinite ethoxylated compounds. In

combination with the average molecular weights and water-soluble property of PEG, the wide range of chain lengths of fatty acids provide identical physical and chemical properties for the proper application selections directly or indirectly.

- HLB numbers describe following characteristics:
- <10 : Lipid soluble (or water-insoluble)
- >10 : Water Soluble
- 4-8 : Antifoaming
- 7-11 : Water-in-oil emulsion
- 12-16 : Oil-in-water emulsion
- 11-14 : Good Wetting
- 12-15 : Good detergency
- 16-20 : Stabilizing
- HLB values of fatty acid compounds are:

Polyethylene Glycol (PEG) Esters are non-toxic and non-irritating nonionic emulsifiers. They are prepared by the esterification of fatty acids with polyethylene glycols. The low molecular weight ranging PEG Esters are oil-soluble to work in nonaqueous systems. The high molecular esters are water-soluble can be used in aqueous systems. Polyethylene Glycol Esters are used as emulsifiers and in formulating emulsifier blends, thickener, resin plasticizer, emollient, opacifier, spreading agent, wetting and dispersing agent, and viscosity control agents. They also have application in the metalworking, pulp, paper, textile and as defoamers for latex paints.

SALES SPECIFICATION

PEG 200 MS

APPEARANCE	light amber semisolid
MELTING POINT	30 C
ACID VALUE	5 max
SAP VALUE	120 - 130
SPECIFIC GRAVITY	0.935 ± 0.010
CLOUD POINT (1% H ₂ O)	< 5 C
APPRX HLB	8.1

PEG 400 MS

APPEARANCE	light amber semisolid
MELTING POINT	33 C
ACID VALUE	5 max
SAP VALUE	85 - 95
SPECIFIC GRAVITY	0.975 ± 0.010
CLOUD POINT (1% H ₂ O)	< 5 C
APPRX HLB	11.5

PEG 600 MS

APPEARANCE	light amber semisolid
MELTING POINT	37 C
ACID VALUE	5 max
SAP VALUE	60 - 70
SPECIFIC GRAVITY	1.000 ± 0.010
CLOUD POINT (1% H ₂ O)	< 55 C
APPRX HLB	13.5

PEG 1000 MS

APPEARANCE	light amber solid
MELTING POINT	42 C

ACID VALUE	5 max
SAP VALUE	40 - 50
SPECIFIC GRAVITY	1.030 ± 0.010
CLOUD POINT (1% H ₂ O)	> 90 C
APPRX HLB	15.5
PEG 4000 MS	
APPEARANCE	light amber solid
MELTING POINT	57 C
ACID VALUE	5 max
SAP VALUE	10 - 20
SPECIFIC GRAVITY	1.075 ± 0.010
CLOUD POINT (1% H ₂ O)	> 100 C
APPRX HLB	18.5
PEG 6000 MS	
APPEARANCE	light amber solid
MELTING POINT	62 C
ACID VALUE	5 max
SAP VALUE	5 - 15
SPECIFIC GRAVITY	1.080 ± 0.010
CLOUD POINT (1% H ₂ O)	> 100 C
APPRX HLB	19.0
TRANSPORTATION	
PACKING	
HAZARD CLASS	
UN NO.	
OTHER INFORMATION	

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X. RELATED PROCEEDINGS APPENDIX

None.